

# The Road Inventory of Moapa Valley National Wildlife Refuge Clark County, NV



Prepared By:  
Federal Highway Administration  
Central Federal Lands Highway Division  
April 2012



# TABLE OF CONTENTS

<u>SECTION</u>		<u>PAGE</u>
I.	<b><u>INTRODUCTION</u></b>	1 - 1
II.	<b><u>SUMMARY INFORMATION</u></b> Summaries by Condition, Surface Type and Functional Class	2 - 1
III.	<b><u>REFUGE ROUTE LOCATION MAPS</u></b>	3 - 1
IV.	<b><u>ROUTE IDENTIFICATION LIST</u></b>	4 - 1
V.	<b><u>ROUTE CONDITION RATING SHEETS</u></b>	5 - 1
VI.	<b><u>PARKING LOT CONDITION RATING SHEETS</u></b>	6 - 1
VII.	<b><u>BRIDGE INVENTORY INFORMATION</u></b>	7 - 1
VIII.	<b><u>PHOTOGRAPHIC SHEETS</u></b>	8 - 1
IX.	<b><u>ACCIDENT SUMMARY</u></b>	9 - 1
	<b><u>APPENDIX</u></b>	
	Functional Classification Table	i
	Description of Rating System	ii

## INTRODUCTION

The Transportation Equity Act for the 21<sup>st</sup> Century (Public Law 105-178) created the Refuge Roads Program. Refuge roads are those public roads that provide access to or within a unit of the National Wildlife Refuge System and for which title and maintenance responsibility is vested in the United States Government. Funds from the Highway Trust Fund are available for refuge roads and can be used by the station to pay the cost of:

- (a) Maintenance and improvements of refuge roads.
- (b) Maintenance and improvements of:
  - (1) Adjacent vehicle parking areas
  - (2) Provision for pedestrians and bicycles and
  - (3) Construction and reconstruction of roadside rest areas that are located in or adjacent to wildlife refuges
- (c) Administrative costs associated with such maintenance and improvements.

The funds available for refuge roads are to be disbursed based on the relative needs of the various refuges in the National Wildlife Refuge System, and taking into consideration:

- (a) The comprehensive conservation plan for each refuge;
- (b) The need for access as identified through land use planning; and
- (c) The impact of land use planning on existing transportation facilities.

To determine the relative needs of the U.S. Fish and Wildlife Service, the Federal Highway Administration (FHWA) was asked to inventory all public access roads and parking lots and provide a condition assessment of each. In 2008 the inventory was expanded to include administrative (service use only) roads and parking lots. An FHWA representative meets with refuge personnel to identify route segments and assign route numbers and functional classifications (See Appendix) for each route. All roads and parking lots are mapped using Trimble GPS units and visually assessed for condition using the RSL method of evaluation developed at Utah State University (See Appendix). Culverts, Gates, Guardrails and Low Water Crossings are also mapped and inspected for any obvious defects.

An estimate is provided, in year 2008 dollars, based on the condition determined by the rating system. Estimates are based upon data and location factors from the 2008 RS Means Heavy Construction Cost Data 22<sup>nd</sup> Annual Edition. Cost estimates should be evaluated on a case-by-case basis when being used for programming purposes.

Native Surfaced roads and parking lots already inventoried will not be re-inventoried and will not appear individually in report chapters 5, 6 and 8. Mileages and areas of native surfaced roads and parking lots will still appear in all summaries in the report and will remain in the road inventory database. In addition to this report, the FHWA will furnish the condition ratings of each route and segment to the Fish and Wildlife Service in a Microsoft Access database so the data can be included in their Real Property Inventory.

## Moapa Valley - 84553 Summaries

### Route Miles and Percentages by Functional Class and Condition

#### Condition Rating (Based on RSL)\*

F. C.	Excellent		Good		Fair		Poor		Failed		TOTAL MILES
	MILES	%	MILES	%	MILES	%	MILES	%	MILES	%	
I	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.00
II	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.00
III	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.00
IV	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.00
V	0.13	9.8%	0.57	42.7%	0.64	47.5%	0.00	0.0%	0.00	0.0%	1.34
<b>Totals</b>	<b>0.13</b>	<b>9.8%</b>	<b>0.57</b>	<b>42.7%</b>	<b>0.64</b>	<b>47.5%</b>	<b>0.00</b>	<b>0.0%</b>	<b>0.00</b>	<b>0.0%</b>	<b>1.34</b>

\*For a description of condition ratings for the various surface types see the Appendix.

### Route Miles and Percentages by Surface Type and Condition

#### Paved Condition Rating [Condition(RSL)]

Surface	Excellent		Good		Fair		Poor		Failed		TOTAL MILES
	MILES	%									
AS	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.00
CO	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.00
<b>Totals</b>	<b>0.00</b>	<b>0.0%</b>	<b>0.00</b>								

#### Unpaved Condition Rating [Condition(RSL)]

Surface	Excellent		Good		Fair		Poor		Failed		TOTAL MILES
	MILES	%	MILES	%	MILES	%	MILES	%	MILES	%	
GR	0.13	9.8%	0.57	42.7%	0.64	47.5%	0.00	0.0%	0.00	0.0%	1.34
NA	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.00
PR	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.00
<b>Totals</b>	<b>0.13</b>	<b>9.8%</b>	<b>0.57</b>	<b>42.7%</b>	<b>0.64</b>	<b>47.5%</b>	<b>0.00</b>	<b>0.0%</b>	<b>0.00</b>	<b>0.0%</b>	<b>1.34</b>

### Square Footage (Parking Areas)

#### Condition Rating

Surface	Excellent		Good		Fair		Poor		Failed		Total SQ FT
	SQ FT	%	SQ FT	%	SQ FT	%	SQ FT	%	SQ FT	%	
AS	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0
CO	548	100.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	548
GR	24,814	71.4%	9,938	28.6%	0	0.0%	0	0.0%	0	0.0%	34,752
NA	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0
PR	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0
<b>Totals</b>	<b>25,362</b>	<b>71.8%</b>	<b>9,938</b>	<b>28.2%</b>	<b>0</b>	<b>0.0%</b>	<b>0</b>	<b>0.0%</b>	<b>0</b>	<b>0.0%</b>	<b>35,300</b>

## Moapa Valley - 84553 Summaries

### Route Miles and Percentages by Use Type and Condition

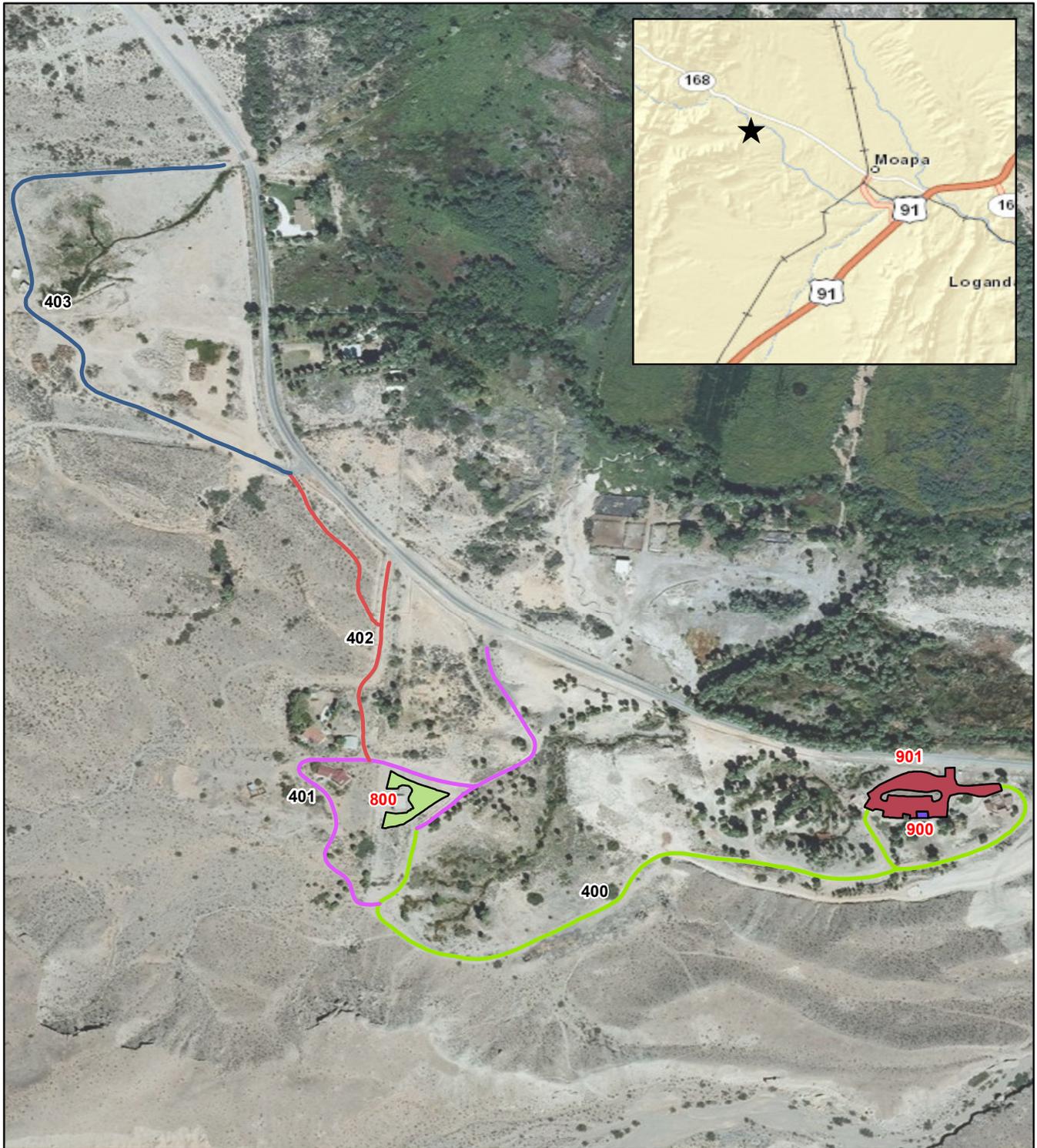
Road Condition Rating: Public/Administrative Use

USE TYPE	Excellent		Good		Fair		Poor		Failed		TOTAL MILES
	MILES	%	MILES	%	MILES	%	MILES	%	MILES	%	
Public (FC I-III)	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.00
Admin (FC IV-V)	0.13	9.8%	0.57	42.7%	0.64	47.5%	0.00	0.0%	0.00	0.0%	1.34
<b>Totals</b>	<b>0.13</b>	<b>9.8%</b>	<b>0.57</b>	<b>42.7%</b>	<b>0.64</b>	<b>47.5%</b>	<b>0.00</b>	<b>0.0%</b>	<b>0.00</b>	<b>0.0%</b>	<b>1.34</b>

Parking Condition Rating: Public/Administrative Use

USE TYPE	Excellent		Good		Fair		Poor		Failed		Total Sq Ft
	Sq Ft	%	Sq Ft	%	Sq Ft	%	Sq Ft	%	Sq Ft	%	
Public	25362	100.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	25,362
Admin	0	0.0%	9938	100.0%	0	0.0%	0	0.0%	0	0.0%	9,938
<b>Totals</b>	<b>25,362</b>	<b>71.8%</b>	<b>9,938</b>	<b>28.2%</b>	<b>0</b>	<b>0.0%</b>	<b>0</b>	<b>0.0%</b>	<b>0</b>	<b>0.0%</b>	<b>35,300</b>

# Moapa Valley National Wildlife Refuge ROUTE LOCATION MAP



**Moapa Valley - 84553  
Route Identification List**

Shading Color Key:

White = Paved Routes
Yellow = Unpaved Routes

RTE #	Asset Number	ROUTE NAME	RTE MI	ROUTE DESCRIPTION	PAVED MI	UN-PAVED MI	LANES	FC
400	10005154	Plummer Unit Road	0.46	From Visitor Center Parking (Route 901) to Pederson Unit Access Road (Route 401)	-	0.46	1	5
401	10005142	Pederson Unit Access Road	0.32	From Warm Spring Road to Plummer Unit Road (Route 400)	-	0.32	1	5
402	10005154	Pederson Unit Road	0.22	From Pederson Unit Access Road (Route 401) to Apcar Unit Road (Route 403)	-	0.22	1	5
403	10005154	Apcar Unit Road	0.34	From Pederson Unit Road (Route 402) to End of Route	-	0.34	1	5

\* Route has more than one Asset Number

**Moapa Valley - 84553**  
**Route Identification List (Parking)**

Shading Color Key:

White = Paved Routes
Green = Unpaved Routes

Route #	Asset Number	ROUTE NAME	Area (Sq Ft)	ROUTE DESCRIPTION	Surface Type
800	10005142	Pederson Unit Shop Parking	9,938	From Pederson Unit Access Road (Route 401)	Gravel
900	10061254	Visitor Center Handicapped Parking	548	From Warm Springs Road	Concrete
901	10061254	Visitor Center Parking	24,814	From Warm Springs Road	Gravel

**CHANGES TO THE FISH AND WILDLIFE SERVICE ROAD INVENTORY REPORT**

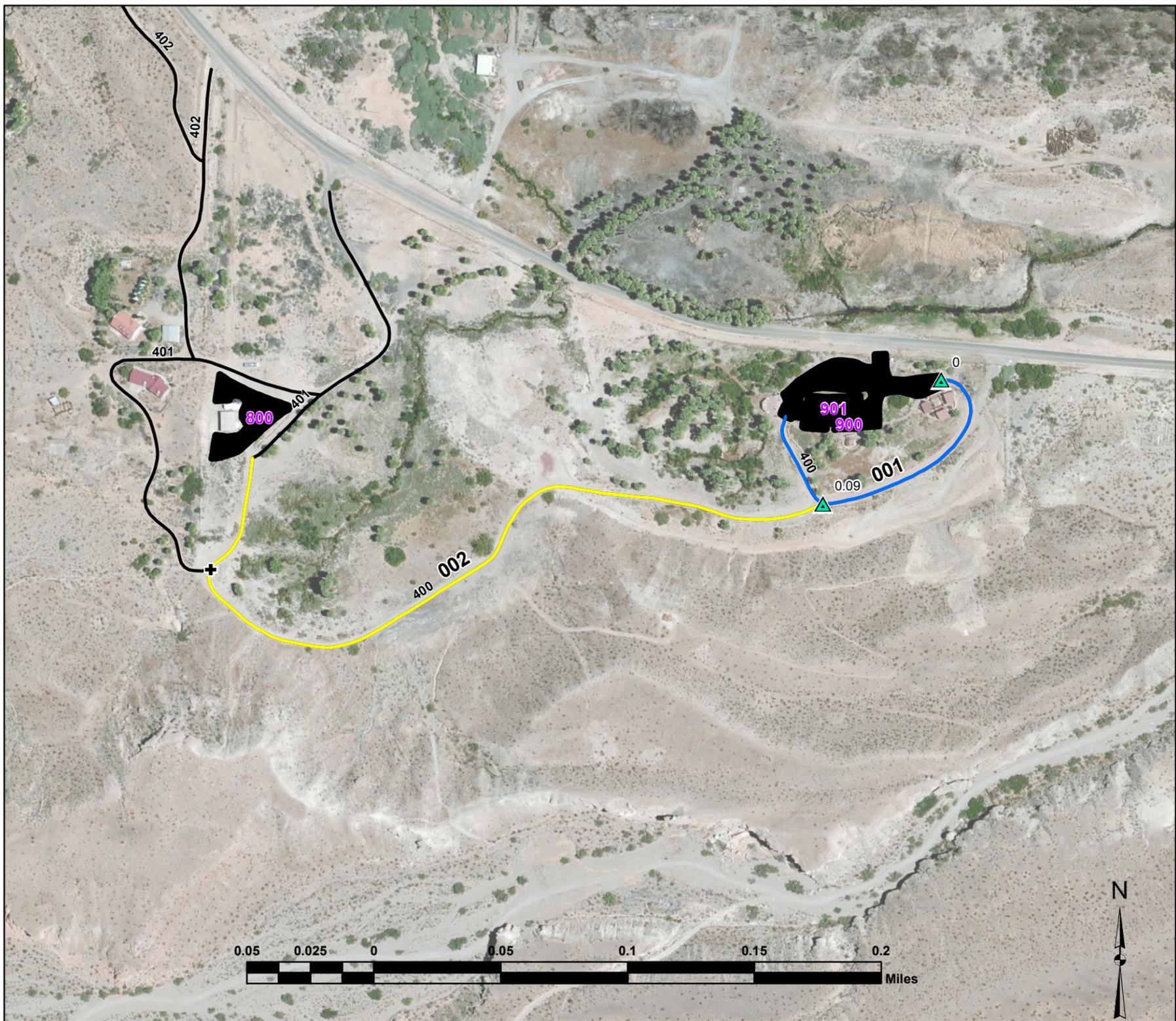
**Moapa Valley NWR**

Routes added to previous inventory:		
Rte #	Rte Name	Reason For Addition
400	Plummer Unit Road	New Administrative Route
401	Pederson Unit Access Road	New Administrative Route
402	Pederson Unit Road	New Administrative Route
403	Apcar Unit Road	New Administrative Route
901	Visitor Center Parking	New Public Route
900	Visitor Center Handicapped Parking	New Public Route
800	Pederson Unit Shop Parking	New Administrative Route

Routes removed from previous inventory:		
Rte #	Rte Name	Reason For Removal

Routes modified from previous inventory:			
Rte #	Rte Name	Type of Modification	Description of Modification

Comments:



<b>Parking</b> 900 Other FWS roads	Gate Admin Bldg Begin Section	Boat Ramp Guardrail Fee Station	Visitor Center Intersection Obstacle	<b>Features</b> Problem Area Political Boundary Railroad Xing Other	Turnout/Parking Bridge Deficiency	Culvert Low_Water_Crossing Water_Control_Structure	<b>Condition:</b> Excellent Good Fair Poor Failed
--	-------------------------------------	---------------------------------------	--	---	---	--	--

### Plummer Unit Road

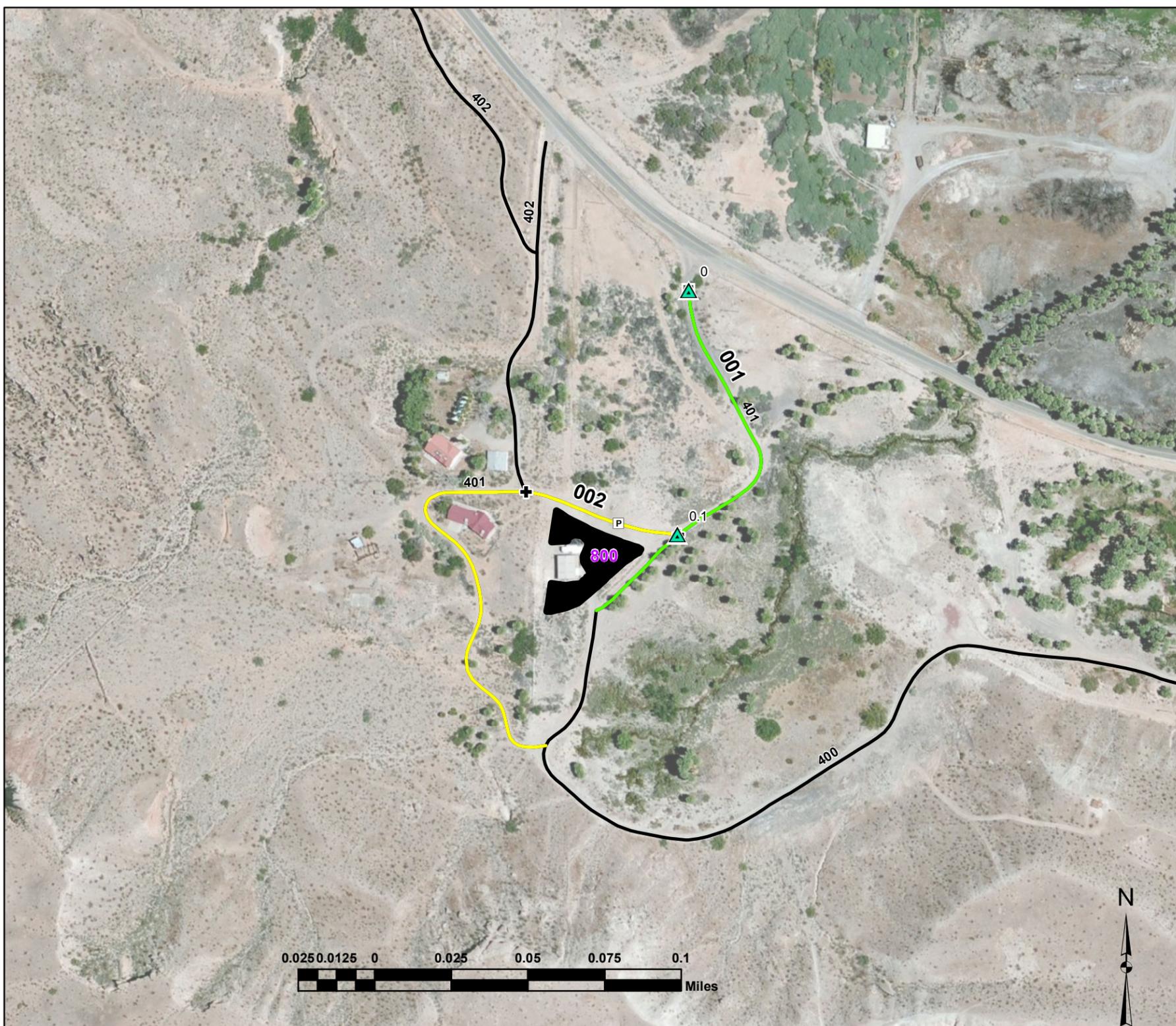
From Visitor Center Parking (Route 901) to Pederson Unit Access Road (Route 401)

Route Number: 400

Total Route Mileage: 0.46

<b>Asset Number</b>	10005154	10005154		
<b>Section Number</b>	001	002		
<b>Section Length (miles)</b>	0.13	0.33		
<b>Inspection Date</b>	12-13-2011	12-13-2011		
<b>Surface Type</b>	Gravel	Gravel		
<b>Number of Lanes</b>	1	1		
<b>Roadway Width (feet)</b>	14	12		
<b>Condition</b>	Excellent	Fair		
<b>Remaining Service Life (years)</b>	8	4		
<b>Estimated Cost to Repair</b>	\$0	\$1,400		
<b>Current Replacement Value</b>	\$106,300	\$267,300		

Features	Mile Post	Features	Mile Post	Features	Mile Post	Features	Mile Post
Begin Section	001-0.0						
Begin Section	002-0.09						
Intersection	002-0.38						



<b>Parking</b> 900 Other FWS roads	Gate Admin Bldg Begin Section	Boat Ramp Guardrail Fee Station	Visitor Center Intersection Obstacle	<b>Features</b> Problem Area Political Boundary Railroad Xing Other	Turnout/Parking Bridge Deficiency	Culvert Low_Water_Crossing Water_Control_Structure	<b>Condition:</b> Excellent Good Fair Poor Failed
--	-------------------------------------	---------------------------------------	--	---	---	--	--

### Pederson Unit Access Road

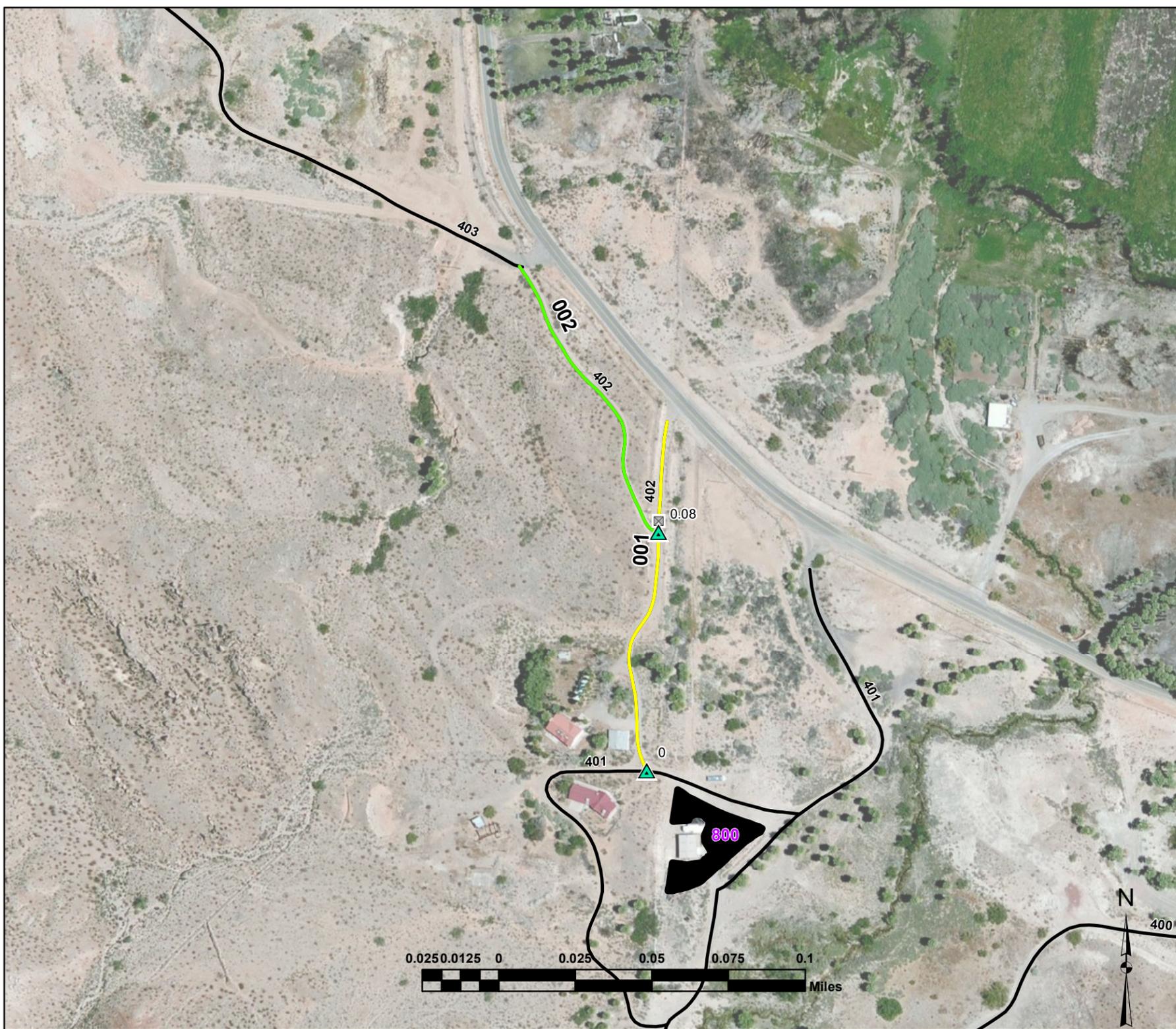
From Warm Spring Road to Plummer Unit Road (Route 400)

Route Number: 401

Total Route Mileage: 0.32

<b>Asset Number</b>	10005142	10005142			
<b>Section Number</b>	001	002			
<b>Section Length (miles)</b>	0.14	0.19			
<b>Inspection Date</b>	12-13-2011	12-13-2011			
<b>Surface Type</b>	Gravel	Gravel			
<b>Number of Lanes</b>	1	1			
<b>Roadway Width (feet)</b>	14	12			
<b>Condition</b>	Good	Fair			
<b>Remaining Service Life (years)</b>	5	4			
<b>Estimated Cost to Repair</b>	\$300	\$800			
<b>Current Replacement Value</b>	\$109,500	\$151,300			

Features	Mile Post	Features	Mile Post	Features	Mile Post	Features	Mile Post
Begin Section	001-0.0						
Gate	001-0.0						
Intersection	001-0.1						
Begin Section	002-0.1						
Turnout/Parking	002-0.12						
Intersection	002-0.15						



<b>Parking</b> 800 Other FWS roads	Gate Admin Bldg Begin Section	Boat Ramp Guardrail Fee Station	Visitor Center Intersection Obstacle	<b>Features</b> Problem Area Political Boundary Railroad Xing Other	Turnout/Parking Bridge Deficiency	Culvert Low_Water_Crossing Water_Control_Structure	<b>Condition:</b> Excellent Good Fair Poor Failed
--	-------------------------------------	---------------------------------------	--	---	---	--	--

### Pederson Unit Road

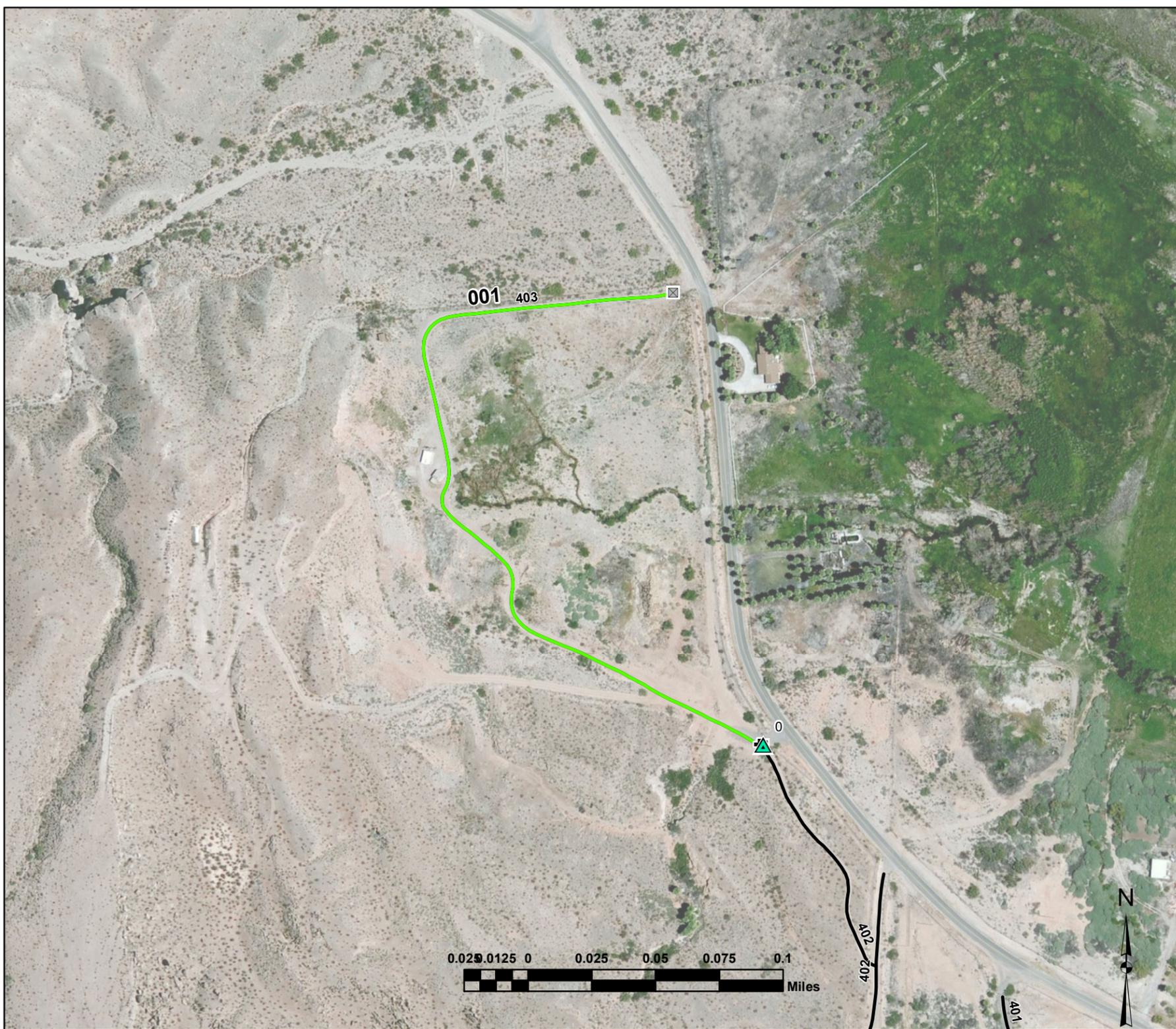
From Pederson Unit Access Road (Route 401) to Aparcar Unit Road (Route 403)

Route Number: 402

Total Route Mileage: 0.22

<b>Asset Number</b>	10005154	10005154			
<b>Section Number</b>	001	002			
<b>Section Length (miles)</b>	0.12	0.10			
<b>Inspection Date</b>	12-13-2011	12-13-2011			
<b>Surface Type</b>	Gravel	Gravel			
<b>Number of Lanes</b>	1	1			
<b>Roadway Width (feet)</b>	14	14			
<b>Condition</b>	Fair	Good			
<b>Remaining Service Life (years)</b>	4	5			
<b>Estimated Cost to Repair</b>	\$500	\$200			
<b>Current Replacement Value</b>	\$95,000	\$82,100			

Features	Mile Post	Features	Mile Post	Features	Mile Post	Features	Mile Post
Begin Section	001-0.0						
Gate	001-0.09						
Begin Section	002-0.08						



<b>Parking</b> 900	Gate	Boat Ramp	Visitor Center	<b>Features</b> * Problem Area • Political Boundary • Railroad Xing • Other	Turnout/Parking	Culvert	<b>Condition:</b> Excellent Good Fair Poor Failed
Other FWS roads	Admin Bldg	Guardrail	Intersection	Obstacle	Bridge	Low_Water_Crossing	
	Begin Section	Fee Station			Deficiency	Water_Control_Structure	

**Apcar Unit Road**  
From Pederson Unit Road (Route 402) to End of Route

Route Number: 403

Total Route Mileage: 0.34

<b>Asset Number</b>	10005154				
<b>Section Number</b>	001				
<b>Section Length (miles)</b>	0.34				
<b>Inspection Date</b>	12-13-2011				
<b>Surface Type</b>	Gravel				
<b>Number of Lanes</b>	1				
<b>Roadway Width (feet)</b>	14				
<b>Condition</b>	Good				
<b>Remaining Service Life (years)</b>	7				
<b>Estimated Cost to Repair</b>	\$600				
<b>Current Replacement Value</b>	\$269,700				

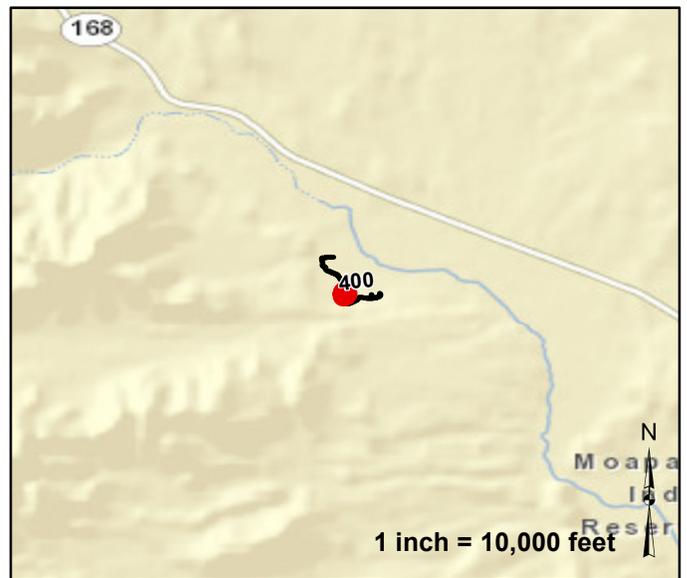
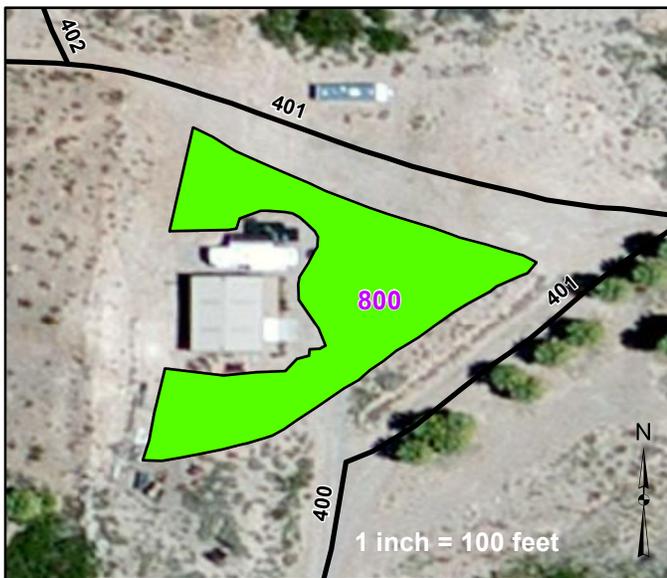
Features	Mile Post	Features	Mile Post	Features	Mile Post	Features	Mile Post
Begin Section	001-0.0						
Gate	001-0.0						
Intersection	001-0.0						
Gate	001-0.34						

# Route Number:800

## Pederson Unit Shop Parking

From Pederson Unit Access Road (Route 401)

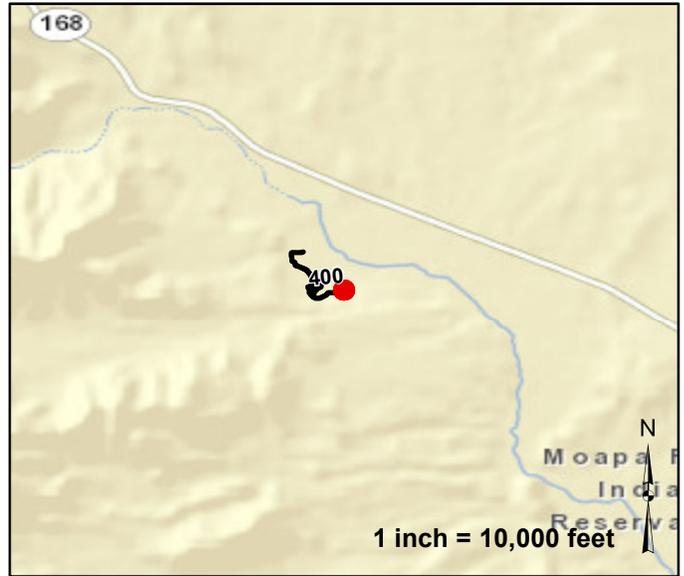
Asset Number	Area	Condition	Surface Type	Cost to Improve	Inspection Date	Current Replacement Value
10005142	9938	Good	Gravel	\$1,700	12-13-2011	\$57,400



Parking		Features				Condition:	
						Excellent	
Other FWS roads						Good	
						Fair	
						Poor	
						Failed	

**Route Number:900**  
**Visitor Center Handicapped Parking**  
**From Warm Springs Road**

Asset Number	Area	Condition	Surface Type	Cost to Improve	Inspection Date	Current Replacement Value
10061254	548	Excellent	Concrete	\$0	12-13-2011	\$7,000



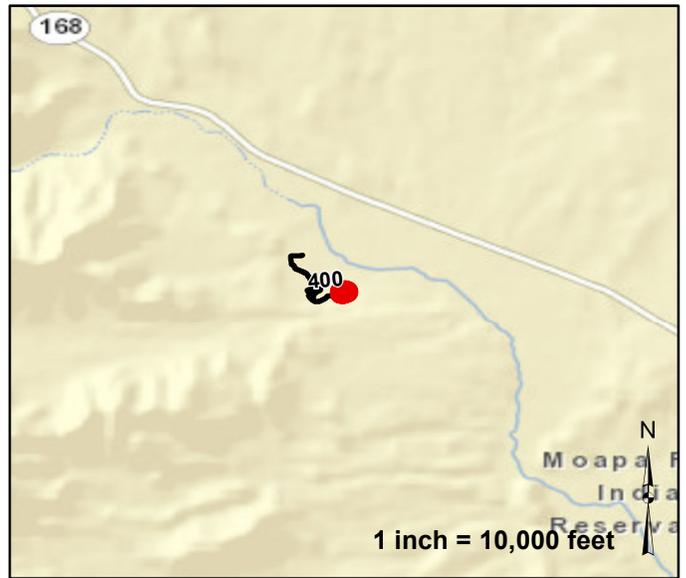
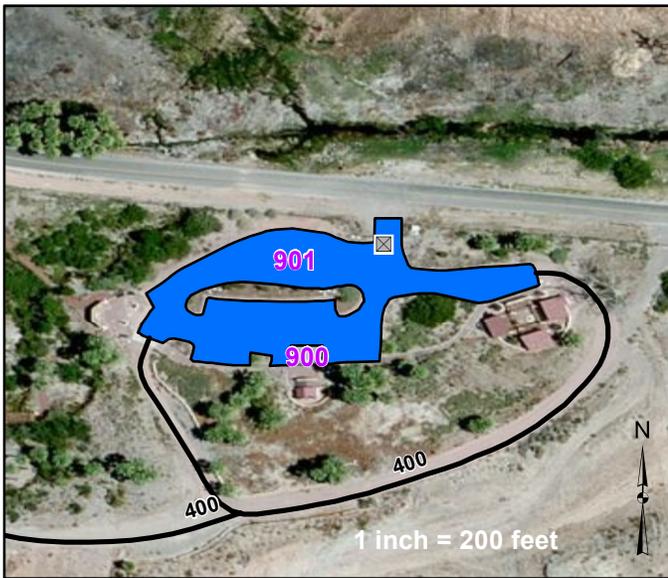
<p><b>Parking</b></p> <p><span style="background-color: black; color: white; padding: 2px;">900</span></p> <p>Other FWS roads</p> <hr style="width: 20px; border: 1px solid black;"/>	<p> Gate</p> <p> Admin Bldg</p> <p> Begin Section</p>	<p><b>Features</b></p> <p> Boat Ramp</p> <p> Guardrail</p> <p> Fee Station</p>	<p> Visitor Center</p> <p> Other</p> <p> Problem Area</p>	<p> Culvert</p> <p> Low Water Crossing</p> <p> Water Control Structure</p>	<p><b>Condition:</b></p> <p> Excellent</p> <p> Good</p> <p> Fair</p> <p> Poor</p> <p> Failed</p>
---	---	--	---	--	--

# Route Number:901

## Visitor Center Parking

### From Warm Springs Road

Asset Number	Area	Condition	Surface Type	Cost to Improve	Inspection Date	Current Replacement Value
10061254	24814	Excellent	Gravel	\$0	12-13-2011	\$143,400



<p><b>Parking</b></p> <p> 900</p> <p>Other FWS roads</p> <p></p>	<p><b>Features</b></p> <p> Gate</p> <p> Admin Bldg</p> <p> Begin Section</p> <p> Boat Ramp</p> <p> Guardrail</p> <p> Fee Station</p>	<p><b>Other</b></p> <p> Visitor Center</p> <p> Other</p> <p> Problem Area</p>	<p><b>Water</b></p> <p> Culvert</p> <p> Low Water Crossing</p> <p> Water Control Structure</p>	<p><b>Condition:</b></p> <p> Excellent</p> <p> Good</p> <p> Fair</p> <p> Poor</p> <p> Failed</p>
--	--	---	--	--

<b>Moapa Valley Bridge Inventory</b>					
<b>Rte #</b>	<b>Milepost</b>	<b>NBIS #</b>	<b>Sufficiency Rating</b>	<b>Functionally Obsolete</b>	<b>Structurally Deficient</b>
<b>No Bridges to Report</b>					

**ROUTE: 400**

**Features Photographs**



Photo: MOVA\_C4\_0442 Route: 400-001-0.0  
Begin Section



Photo: MOVA\_C4\_0443 Route: 400-002-0.09  
Begin Section

**ROUTE: 401**

**Features Photographs**



Photo: MOVA\_C4\_0445 Route: 401-001-0.0  
Begin Section



Photo: MOVA\_C4\_0444 Route: 401-001-0.0  
Metal Chain Link Gate  
Asset# 10005136



Photo: MOVA\_C4\_0446 Route: 401-002-0.1  
Begin Section

**ROUTE: 402**

**Features Photographs**



Photo: MOVA\_C4\_0449 Route: 402-001-0.0  
Begin Section



Photo: MOVA\_C4\_0450 Route: 402-001-0.09  
Metal Chain Link Gate  
Asset# 10061246



Photo: MOVA\_C4\_0451 Route: 402-002-0.08  
Begin Section

**ROUTE: 403**

**Features Photographs**



Photo: MOVA\_C4\_0453 Route: 403-001-0.0  
Begin Section



Photo: MOVA\_C4\_0452 Route: 403-001-0.0  
Metal Chain Link Gate  
Asset# 10061246



Photo: MOVA\_C4\_0454 Route: 403-001-0.34  
Metal Chain Link Gate  
Asset# 10005154

**ROUTE: 901**

**Features Photographs**



Photo: MOVA\_C4\_0437 Route: 901  
Metal Chain Link Gate  
Asset# 10061246

### Accident Summary

Number of Accidents Reported	Timespan of Accidents	Injuries	Fatalities
0	No Accidents to Report	0	0

## APPENDIX

<b>TABLE 1 - GENERAL FWS ROAD FUNCTIONAL CLASSIFICATION</b>	
<b>Class I</b>	Principal Refuge Road (Public Roads) - Routes that constitute the main access route, main auto tour route, or thoroughfare for refuge visitors. These routes are accessible by 2WD vehicles. Routes are numbered from 10 to 99.
<b>Class II</b>	Connector Refuge Road (Public Roads) - Routes that provide circulation within the refuge. These routes can also provide access to areas of scenic, scientific, recreational or cultural interest, such as overlooks, campgrounds, education centers, etc. These routes are accessible by 2WD vehicles. Routes are numbered from 100 to 199.
<b>Class III</b>	Special Purpose Refuge Road (Public Roads) - Roads that provide circulation within special use areas such as campgrounds or public concessionaire facilities or access to remote areas of the refuge. These routes may not be 2WD accessible. Routes are numbered from 200 to 299
<b>Class IV</b>	Administrative Access Road (Administrative Roads) - Routes intended for access to administrative developments or structures such as maintenance offices, employee quarters, or utility areas. These routes are accessible by 2WD vehicles. These routes may restrict access to the general public. Routes are numbered from 300 to 399.
<b>Class V</b>	Restricted Road (Administrative Roads) - Routes normally closed to the public, such as maintenance roads, service roads, patrol roads, and fire breaks. These routes may be open to the public for a short period of time for a special use, such as hunting access. These routes may not be 2WD accessible. Routes are numbered from 400 to 499.

A refuge road system contains those routes within or giving access to a refuge or other unit of the FWS that are administered by the FWS, or by the Service in cooperation with other agencies. The assignment of a functional classification (FC) to a refuge road is not based on traffic volumes or design speed, but on the intended use or function of that route

## DESCRIPTION OF RATING SYSTEM

Rating Data is collected on four different surface types: Asphalt, Concrete, Gravel, and Native. The Utah LTAP Center's Remaining Service Life (RSL) system is used for all surface types. The RSL system is based on the Strategic Highway Research Program's (SHRP) Distress Identification Manual.

### Asphalt Rating System

Data is collected on the following distresses and conditions:

- **Fatigue Cracking** - Interconnected cracks forming small irregular shapes.
- **Longitudinal Cracking** - Cracks running parallel with the roadway, in the direction of traffic.
- **Transverse Cracking** - Cracks perpendicular to the roadway, going across the lane or lanes.
- **Block Cracking** - Interconnected cracks forming large blocks.
- **Edge Cracking** - Cracks running along the edge of the pavement surface.
- **Patches** - Original surface repaired with new asphalt patch material.
- **Potholes** - Holes or depressions in the pavement.
- **Rutting** - surface depressions in the wheel paths.
- **Roughness** - Evenness of pavement for serviceability.
- **Drainage** - Ability of the road surface to drain water based on proper slope.

A Condition Rating value is calculated for each homogenous pavement section, and can be up to 1 mile in length.

### Rating Index Formula

Fatigue, longitudinal, transverse, block, and edge cracking, along with patching and potholes are rated on a 0 - 9 scale (0 = no distress, 9 = maximum distress). The rating given is based on the extent and the severity of the distress. Rutting, roughness, and drainage are rated on a 0 - 3 scale (0 = excellent, 3 = poor). Each distress type has given Remaining Service Life (RSL) values (in years) based on the rating for that particular distress. The distress with the rating resulting in the lowest RSL value is considered to be the governing distress. That value is then assigned as the RSL of the road segment.

### Concrete Rating System

Data is collected on the following distresses and conditions:

- **Spalling of Joints** - Chipping, breaking, or cracking of slab edges
- **Joint Seal Damage** - Any damage or condition that enables materials or water to infiltrate into the joint from the surface.
- **Corner Breaks** - A portion of the slab separated by a crack that intersects the adjacent transverse and longitudinal joints, forming approximately a 45° angle to the direction.
- **Broken Slabs** - Faulting and/or cracking localized to individual slabs.

- **Faulting** – Difference in elevation across a crack or joint.
- **Longitudinal Cracking** – Cracks in the pavement running parallel to road.
- **Transverse Cracking** - Cracks in the pavement running perpendicular to the direction of traffic.
- **Patch Deterioration** – Faulting, settling, or cracking of previously placed patch
- **Map Cracking** – A series of cracks that extend only into the upper surface of the Slab

A Condition Rating value is calculated for each homogenous pavement section, and can be up to 1 mile in length.

### **Rating Index Formula**

The rating procedure for concrete pavement is the same as that for asphalt pavement described previously. Each of the distresses described above are rated on the same 0 – 9 scale. The governing distress is then determined and the RSL associated with that distress is assigned to the road segment.

### **Gravel and Native Rating System**

Data is collected on the following distresses and conditions:

- **Cross Section (Crown)** - Roadway built so that the center is higher than the shoulder, to prevent water from pooling on roadway.
- **Roadside Drainage** - Roadside ditches and culverts to handle water flow and prevent pooling on the roadside.
- **Corrugations (Washboarding)** - Small trenches or holes developing perpendicular to the roadway.
- **Potholes** - Holes or depressions in the roadway.
- **Rutting** - Depressions running parallel with the roadway, in the wheelpaths.
- **Dust** - Amount of dust caused by traffic.
- **Loose Aggregate (Gravel Only)** - Loose gravel, typically piled up on the roadway edges or centerline.

A Condition Rating value is calculated for each homogenous pavement section, and can be up to 1 mile in length.

### **Rating Index Formula**

The rating procedure for unpaved roads is the same as that for asphalt and concrete pavements described previously. Of the distresses described above, corrugations, potholes, rutting, and loose aggregate are rated on the same 0 – 9 scale previously mentioned. Cross section, roadside drainage, and dust are rated on the same 0 – 3 scale described for asphalt pavement. The governing distress is then determined and the RSL associated with that distress is assigned to the road segment.

## Condition Descriptions by Surface Type

The following definitions are used to describe pavement condition for the various surface types. These are general guidelines for condition indications.

### Asphalt

**Excellent** – Recently constructed or overlaid road where construction or overlay was performed correctly- No maintenance required. RSL = 19-20 years.

**Good** – Low extent longitudinal and transverse cracks. All cracks are 1/4" or less with little or no crack erosion. Patches are in good condition and applied correctly. Routine Maintenance recommended. RSL = 13-18 years.

**Fair** - Roads are in good structural condition with little or no fatigue cracking. Longitudinal, transverse, and edge cracking is at medium extent and severity. Block cracking is not extensive. Any patches are in good condition. Preventative maintenance recommended. RSL = 7-12 years.

**Poor** - Road beginning to show signs of structural distress. Fatigue cracking is medium to high extent and medium severity. Cracking will be severe. Surface may have severe block cracking and show. Patches are in fair to poor condition. There is moderate distortion or rutting and occasional potholes. Rehabilitation recommended. RSL = 1-6 years.

**Failed** - Road is severely deteriorated. Signs of structural failure appear along with severe and extensive fatigue cracking, distortion, potholes, or extensive patches in poor condition. Reconstruction recommended. RSL = 0 years.

### Concrete

**Excellent** - New pavement. No maintenance required. RSL = 19-20 years

**Good** - First signs of transverse cracking, patch or repair, more extensive pop-outs, or scaling. Sealing or routine maintenance recommended. RSL = 13-18 years.

**Fair** – Pavement has joint or crack spalling, and/or faulting, along with cracking at corners with broken pieces. Any Patches are in fair condition and faulting is at a minimum. Preventative maintenance recommended. RSL = 7-12 years.

**Poor** - Joints and cracks are open 1 inch, spalled, or patched. Faulting is more severe. Rehabilitation recommended. RSL = 1-6 years.

**Failed** - Most slabs have failed structurally, and faulting is severe. Reconstruction recommended. RSL = 0 years.11-9

The following table shows the relationship between RSL and condition.

SUBJECTIVE CONDITION RATING FOR REMAINING SERVICE LIFE (Asphalt and Concrete Pavements)								
	FAILED	POOR		FAIR		GOOD		EXCELLENT
RSL Years	0	1-3	4-6	7-9	10-12	13-15	16-18	19-20

### Gravel and Native

**Note** - Native surfaces do not have a gravel layer.

**Excellent** - Newly constructed road that has been constructed properly with proper crown, drainage and gravel layer. Little or no distress. No maintenance recommended. RSL = 8-10 years.

**Good** - Crown, drainage provisions, and gravel layer are in good condition. Distress limited to traffic effects such as dust, loose aggregate, and low severity corrugations (wash boarding). RSL = 5-7 years.

**Fair** - Adequate drainage and crown through majority of roadway. Crown repair, ditch improvement may be necessary. Road has more severe corrugations and potholes. Preventative maintenance recommended. RSL = 3-4 years.

**Poor** - Travel at slow speeds is necessary. Additional gravel layer needed to carry traffic. Poor crown. Ditching is inadequate and rutting is extensive and severe. Rehabilitation recommended. RSL = 1-2 years.

**Failed** - Travel is difficult, and road may be closed at times. Rutting and Corrugations are very severe. Total Reconstruction of road is recommended. RSL = 0 years.

The following table shows the RSL values for gravel and native roads in terms of excellent, good, fair, poor, and failed condition.

SUBJECTIVE CONDITION RATING FOR REMAINING SERVICE LIFE (Gravel and Native Surfaces)					
	FAILED	POOR	FAIR	GOOD	EXCELLENT
RSL Years	0	1-2	3-4	5-7	8-10

# NATIVE PRIMITIVE/IMPROVED RATING SHEET

## Cross Section (Crown)\*

Severity	Condition		Description
	No Defects	0	Crown 4-6" with no restriction of water flow from centerline to ditch.
	Minor Defects	1	Inadequate or inconsistent crown. Drainage to ditch may be restricted.
	Moderate Defects	2	Flat crown, drainage to ditch restricted.
	Major Defects	3	Reverse crown, bowl-shaped road, drainage on roadway

## Rutting

Severity	Extent (Length)			
	No Defects	Low <10%	Med 10-30%	High >30%
	Low < 6"	1	2	3
	Med 6-12"	4	5	6
	High > 12"	7	8	9

## Roadside Drainage\*

Severity	Condition		Description
	No Defects	0	Wide, deep ditches (>4') with no restriction to water flow.
	Minor Defects	1	Adequate ditches (>2' deep), minor obstructions restrict water flow.
	Moderate Defects	2	Shallow, narrow and obstructed ditches. Minor erosion of road.
	Major Defects	3	No ditch, drainage on roadway with moderate to severe erosion.

## Potholes

Severity	Extent (Area)			
	No Defects	Low <10%	Med 10-30%	High >30%
	Low < 6"	1	2	3
	Med 6-12"	4	5	6
	High > 12"	7	8	9

## Dust

Severity	Condition		Description
	No Defects	0	No obstruction to sight distance.
	Minor Defects	1	Sight distance > 550'
	Moderate Defects	2	Sight distance 225'-550'
	Major Defects	3	Sight distance < 225'

## Corrugations

Severity	Extent (Length)			
	No Defects	Low <10%	Med 10-30%	High >30%
	Low < 3"	1	2	3
	Med 3-6"	4	5	6
	High > 6"	7	8	9

\* Crown and Drainage are not rated for roads that have no constructed crown or drainage. This applies to Native and Gravel roads.

# GRAVEL RATING SHEET

## Cross Section (Crown)

Severity	Condition		Description
	No Defects	0	Crown 4-6" with no restriction of water flow from centerline to ditch.
	Minor Defects	1	Inadequate or inconsistent crown. Drainage to ditch may be restricted.
	Moderate Defects	2	Flat crown, drainage to ditch restricted.
	Major Defects	3	Reverse crown, bowl-shaped road, drainage on roadway

## Rutting

Severity	No Defects	Extent (Length)		
		Low <10%	Med 10-30%	High >30%
	Low < 1"	1	2	3
	Med 1-3"	4	5	6
	High > 3"	7	8	9

## Roadside Drainage

Severity	Condition		Description
	No Defects	0	Wide, deep ditches (>4') with no restriction to water flow.
	Minor Defects	1	Adequate ditches (>2' deep), minor obstructions restrict water flow.
	Moderate Defects	2	Shallow, narrow and obstructed ditches. Minor erosion of road.
	Major Defects	3	No ditch, drainage on roadway with moderate to severe erosion.

## Potholes

Severity	No Defects	Extent (Area)		
		Low <10%	Med 10-30%	High >30%
	Low < 1"	1	2	3
	Med 1-3"	4	5	6
	High > 3"	7	8	9

## Dust

Severity	Condition		Description
	No Defects	0	No obstruction to sight distance.
	Minor Defects	1	Sight distance > 550'
	Moderate Defects	2	Sight distance 225'-550'
	Major Defects	3	Sight distance < 225'

## Corrugations

Severity	No Defects	Extent (Length)		
		Low <10%	Med 10-30%	High >30%
	Low < 2"	1	2	3
	Med 2-4"	4	5	6
	High > 4"	7	8	9

\* Crown and Drainage are not rated for roads that have no constructed crown or drainage. This applies to Native and Gravel roads.

## Loose Aggregate

Severity	No Defects	Extent (Area)		
		Low <10%	Med 10-30%	High >30%
	Low < 1"	1	2	3
	Med 1-3"	4	5	6
	High > 3"	7	8	9

# ASPHALT RATING SHEET

<b><u>Fatigue Cracking</u></b>				
		<b>Extent</b>		
No Defects		Low 1 crack WP	Med 2 cracks WP	High >30% length
<b>Severity</b>	Low-Cracks < 1/4"	1	2	3
	Med-Cracks 1/4-3/4"	4	5	6
	High-Cracks > 3/4"	7	8	9

<b><u>Edge Cracking</u></b>				
		<b>Extent (Length)</b>		
No Defects		Low <10%	Med 10-30%	High >30%
<b>Severity</b>	0-6" from curb	1	2	3
	6-18" from curb	4	5	6
	> 18" from curb	7	8	9

<b><u>Longitudinal Cracking</u></b>				
		<b>Extent</b>		
No Defects		Low 1 crack full length	Med 2 cracks full length	High >2 cracks full length
<b>Severity</b>	Low-Cracks < 1/4"	1	2	3
	Med-Cracks 1/4-3/4"	4	5	6
	High-Cracks > 3/4"	7	8	9

<b><u>Block Cracking</u></b>				
		<b>Extent (Length)</b>		
No Defects		Low > 15x15' squares	Med 15-10' squares	High <10x10' squares
<b>Severity</b>	Low-Cracks < 1/4"	1	2	3
	Med-Cracks 1/4-3/4"	4	5	6
	High-Cracks > 3/4"	7	8	9

<b><u>Transverse Cracking</u></b>				
		<b>Extent (ft between cracks)</b>		
No Defects		Low > 200'	Med 200-50'	High < 50'
<b>Severity</b>	Low-Cracks < 1/4"	1	2	3
	Med-Cracks 1/4-3/4"	4	5	6
	High-Cracks > 3/4"	7	8	9

<b><u>Utility Cuts</u></b>				
		<b>Extent (Length)</b>		
No Defects		Low <10%	Med 10-30%	High >30%
<b>Severity</b>	Low-Cracks < 1/4"	1	2	3
	Med-Cracks 1/4-3/4"	4	5	6
	High-Cracks > 3/4"	7	8	9

<b><u>Drainage/Roughness/Rutting</u></b>			
	<b>Condition</b>	<b>Description</b>	
<b>Severity</b>	No Defects	0	Wide, deep ditches with no obstructions, smooth ride, no rutting, no potholes.
	Minor Defects	1	Drainage may be obstructed, < 1" rutting, minor roughness.
	Moderate Defects	2	Poor drainage, 1-2" rutting, noticeable roughness, potholes < 6" wide.
	Major Defects	3	No drainage; > 2" rutting; potholes 6-12" wide create roughness requiring reduced speeds.

# CONCRETE RATING SHEET

<b>Spalling of Joints</b>				
Extent (% joints)				
	No Defects	Low <10%	Med 10-20%	High >20%
<b>Severity</b>	Low Spalls < 3"	1	2	3
	Med Spalls 3-6"	4	5	6
	High Spalls > 6"	7	8	9

<b>Broken Slabs</b>				
Extent (% slabs)				
	No Defects	Low <5%	Med 5-15%	High >15%
<b>Severity</b>	Low-no more than 3 pieces, no spalling/faulting	1	2	3
	Med-broken into >3 pieces, spalling/faulting <1/4"	4	5	6
	High-4 or more pieces, spalling/faulting >1/4"	7	8	9

<b>Transverse Cracks</b>				
Extent (% slabs)				
	No Defects	Low <10%	Med 10-20%	High >20%
<b>Severity</b>	Low-Cracks < 1/8"; no spalling/faulting	1	2	3
	Med-Cracks 1/8-1/2"; spall <3", fault >1/4"	4	5	6
	High-Cracks > 1/2"; spall >3", fault >1/4"	7	8	9

<b>Joint Seal Damage</b>				
Extent (%joints)				
	No Defects	Low <10%	Med 10-20%	High >20%
<b>Severity</b>	Low <10% joint length	1	2	3
	Med 10-50% joint length	4	5	6
	High >50% joint length	7	8	9

<b>Faulting</b>				
Extent (Length)				
	No Defects	Low <10%	Med 10-30%	High >30%
<b>Severity</b>	Low < 1/2"	1	2	3
	Med 1/2-1"	4	5	6
	High > 1"	7	8	9

<b>Patch Deterioration</b>				
Extent (Area)				
	No Defects	Low <10%	Med 10-30%	High >30%
<b>Severity</b>	Low-no fault, no settle at perimeter	1	2	3
	Med-fault & settle <1/4" at perimeter	4	5	6
	High-fault & settle >1/4" at perimeter, cracked patch	7	8	9

<b>Corner Breaks</b>				
Extent (% of slabs)				
	No Defects	Low <10%	Med 10-20%	High >20%
<b>Severity</b>	Low-corner cracks, no spalling or faulting	1	2	3
	Med-crack slightly spalled & faulted <1/4"	4	5	6
	High-crack highly spalled & faulted >1/4"	7	8	9

<b>Longitudinal Cracks</b>				
Extent (% slabs)				
	No Defects	Low <10%	Med 10-20%	High >20%
<b>Severity</b>	Low-Cracks < 1/8"; no spalling/faulting	1	2	3
	Med-Cracks 1/8-1/2"; spall <3", fault >1/2"	4	5	6
	High-Cracks > 1/2"; spall >3", fault >1/2"	7	8	9

<b>Map Cracks</b>				
Extent (Area)				
	No Defects	Low <10%	Med 10-20%	High >20%
<b>Severity</b>	Low-small connected cracks, no spalling	1	2	3
	Med-connected cracks, no spalling	4	5	6
	High-large connected cracks with surface spalling	7	8	9

# Deficiency Ratings With Associated Remaining Service Life

## Asphalt Rating Sheet

Fatigue Cracking		Edge Cracking		Transverse Cracking		Utility Cuts	
Distress Rating	Remaining Service Life	Distress Rating	Remaining Service Life	Distress Rating	Remaining Service Life	Distress Rating	Remaining Service Life
0	20	0	20	0	20	0	20
1	10	1	12	1	14	1	14
2	8	2	10	2	12	2	12
3	6	3	8	3	10	3	10
4	8	4	10	4	12	4	12
5	6	5	8	5	10	5	10
6	4	6	6	6	8	6	8
7	6	7	8	7	10	7	10
8	2	8	6	8	6	8	6
9	0	9	4	9	2	9	2

Longitudinal Cracking		Block Cracking		Drainage/Roughness/Rutting	
Distress Rating	Remaining Service Life	Distress Rating	Remaining Service Life	Distress Rating	Remaining Service Life
0	20	0	20	0	20
1	14	1	12	1	16
2	12	2	10	2	10
3	10	3	8	3	4
4	12	4	10		
5	10	5	8		
6	8	6	6		
7	10	7	12		
8	8	8	6		
9	6	9	2		

## Concrete Rating Sheet

Spalling		Broken Slabs		Transverse Cracks	
Distress Rating	Remaining Service Life	Distress Rating	Remaining Service Life	Distress Rating	Remaining Service Life
0	20	0	20	0	20
1	15	1	15	1	18
2	12	2	12	2	15
3	10	3	10	3	12
4	12	4	12	4	15
5	10	5	10	5	10
6	8	6	8	6	6
7	10	7	10	7	10
8	6	8	6	8	4
9	0	9	0	9	0

Joint Seal Damage		Faulting		Patch Deterioration	
Distress Rating	Remaining Service Life	Distress Rating	Remaining Service Life	Distress Rating	Remaining Service Life
0	20	0	20	0	18
1	16	1	15	1	16
2	14	2	12	2	14
3	12	3	10	3	12
4	14	4	12	4	12
5	10	5	8	5	10
6	8	6	6	6	8
7	12	7	10	7	10
8	8	8	4	8	6
9	6	9	0	9	0

Corner Breaks		Longitudinal Cracks		Map Cracks	
Distress Rating	Remaining Service Life	Distress Rating	Remaining Service Life	Distress Rating	Remaining Service Life
0	18	0	20	0	20
1	16	1	18	1	18
2	14	2	15	2	15
3	12	3	12	3	12
4	12	4	15	4	12
5	10	5	10	5	10
6	8	6	6	6	6
7	10	7	10	7	10
8	6	8	4	8	4
9	0	9	0	9	0

SUBJECTIVE CONDITION RATING FOR REMAINING SERVICE LIFE IN YEARS (Asphalt & Concrete Roads)

<b>RSL</b>	<b>FAILED</b> 0	<b>POOR</b> 1 - 6	<b>FAIR</b> 7 - 12	<b>GOOD</b> 13 - 18	<b>EXCELLENT</b> 19 - 20
------------	--------------------	----------------------	-----------------------	------------------------	-----------------------------

# Deficiency Ratings With Associated Remaining Service Life

## Native Primitive Improved Rating Sheet

Cross Section		Rutting		Roadside Drainage	
Distress Rating	Remaining Service Life	Distress Rating	Remaining Service Life	Distress Rating	Remaining Service Life
0	10	0	10	0	10
1	7	1	9	1	8
2	5	2	7	2	4
3	0	3	5	3	0
		4	7		
		5	4		
		6	3		
		7	4		
		8	2		
		9	0		

Potholes		Dust		Corrugations	
Distress Rating	Remaining Service Life	Distress Rating	Remaining Service Life	Distress Rating	Remaining Service Life
0	10	0	10	0	10
1	9	1	8	1	9
2	7	2	6	2	7
3	5	3	2	3	7
4	7			4	6
5	4			5	5
6	3			6	5
7	4			7	4
8	2			8	3
9	0			9	0

## Gravel Rating Sheet

Cross Section		Rutting		Roadside Drainage	
Distress Rating	Remaining Service Life	Distress Rating	Remaining Service Life	Distress Rating	Remaining Service Life
0	10	0	10	0	10
1	7	1	9	1	8
2	5	2	7	2	4
3	0	3	5	3	0
		4	7		
		5	4		
		6	3		
		7	4		
		8	2		
		9	0		

Potholes		Dust		Corrugations	
Distress Rating	Remaining Service Life	Distress Rating	Remaining Service Life	Distress Rating	Remaining Service Life
0	10	0	10	0	10
1	9	1	8	1	9
2	7	2	6	2	7
3	5	3	2	3	7
4	7			4	6
5	4			5	5
6	3			6	5
7	4			7	4
8	2			8	3
9	0			9	0

Loose Aggregate	
Distress Rating	Remaining Service Life
0	10
1	9
2	8
3	7
4	8
5	7
6	6
7	5
8	3
9	0

SUBJECTIVE CONDITION RATING FOR REMAINING SERVICE LIFE IN YEARS (Gravel & Native Roads)

	FAILED	POOR	FAIR	GOOD	EXCELLENT
RSL	0	1 - 2	3 - 4	5 - 7	8 - 10